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BEEBLET

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Volume 10 Number 1 March 1992

BBC/ACORN

COMPUTER USER GROUP NZ (Inc)

EDITORIAL

Once again another *Beeblet* is almost ready for the printers.

This issue is numbered Volume 10 No 1. At the start of the 10th year of publication it may also be the last BBC/Acorn User Group magazine to appear exclusively in this format. It is also my last as editor after the shortest term of the four who have held that position. Anne Flower, Bruce Wills and Graham Ellett steered the magazine through the most active periods.

The changes which are likely to follow the AGM are an inevitable consequence of the technological changes associated with microcomputers. Paper based systems (and the readers) cannot cope with program listings for the Archimedes. Telecommunications improvements make Bulletin Board Systems a much better way of communicating to computer users. They are interactive, much more immediate and you can download software ready to use.

These are positive moves to exploit the very technology which concerns us. The only negative aspect prompting the change has been the lack of input from most members. I hope the new methods of communication may rekindle the interest which was evident after the BBC Microcomputer was introduced 10 years ago.

Thanks to Llew Amon, Dunedin, and Don McDonald, Wellington for their contributions to this issue. Much of it is a follow up to Llew's article in the last issue.

Once again an apology. The September issue still did not appear as it was really intended. The cover should have been on card. My mock up copy also disappeared. If you received a copy which has 150 dpi print on bond paper (slightly lighter than copy paper), Alex Carr can supply you with a better quality copy.

Thanks to Alex, our Membership Officer, who sees that you all get your copy.

Apologies for some omissions. I had planned to give some more information on currently available machines and their prices. A shift of house and pressure of the deadline for the AGM notice prevented completion of this.

I don't know what form the next communication with members will take. However all current members should expect some follow up to the AGM and information on the options available for continued membership. I hope a good number of you are still interested in happenings in the Acorn world and continue to support the Group through your membership.

Happy Computing,

Colin Scarf

BBC/ACORN COMPUTER USER GROUP NZ INC

ANNUAL GENERAL MEETING

The following are the details of the 1992 Annual General Meeting of the BBC/Acorn User Group of New Zealand Inc :

LOCATION

Epuni Community Centre

corner of Oxford Terrace and Mitchell Street

(opposite Epuni Railway Station)

Lower Hutt

DATE AND TIME

7-45 pm, Wednesday 18 March 1992

All members and intending members are cordially invited to this meeting, particularly any from outside of Wellington who can attend.

AGENDA

1 Apologies
2 Minutes of the previous AGM
(published in *Beeblet* September 1991)
3 Matters arising from the minutes
4 Correspondence
5 Matters arising from the correspondence
6 President's report
7 Local Group's reports
8 Financial report
9 Election of Officers
10 General Business

The AGM is the opportunity for the membership to express opinions on the running of the National User Group and for ideas on the future operation and nature of the Group.

Those members not able to attend and wishing to express ideas, or offers of assistance are asked to write to the Secretary, PO Box 9592, Wellington.

President's Report

Being seriously impaired in producing the National User Group magazine, *Beeblet,* the lifeline of communication with our members, your Committee has been looking at the options available. Closing down the National User Group has been the least desirable option.

We have an obligation to promote/protect the interests of members, but we have always felt special responsibility for those who are unable to participate with Local User Groups.

Never-the-less, right at the end of last year, it looked as though no other practical option was available but to recommend that we wind up.

However, a group of members of the Wellington Local User Group are proposing to establish a Bulletin Board which will be able to be used for the distribution of material which would have otherwise been published in *Beeblet*, with the advantage of such material remaining in electronic form.

Publishing *Beeblet* in paper form has a number of disadvantages which were becoming painfully more obvious as time went by; not the least of which was the need for readers to re-enter programs. By making the National User Group part of this BBS project, members will be able to participate from wherever they happen to be in New Zealand, with degrees of freedom and immediacy not previously experienced.

But what is proposed for members not equipped with modem and communication programs? The group is proposing a number of solutions which include:

> assisting members to obtain the hardware/software required to obtain full communications,
>
> supplying material on disc by mail, or
>
> printing out and mailing material on a regular basis.

Introducing more modern means of supplying BBC/Acorn information is the way of the future. Since the proposers will continue to have all members' interests (and limitations) in mind as they finalise their proposal, we on the current National User Group Committee recommend all members support the proposal.

Your views are invited. Please write to the Secretary at PO Box 9592, Wellington, in time to arrive before 14 March (ie., well prior to the AGM).

Graham Ellett,

WELLINGTON USER GROUP PROPOSAL FOR THE FUTURE OF THE GROUP

As mentioned in the President's Report, it is not now the intention to proceed with the winding up of the National User Group. Instead, a group of Wellington members is standing for election to the committee at the AGM.

If they are successful, the activities of the National Group and the Wellington Group will be combined. Provision will be made for a special membership class for those outside Wellington so that they can continue to receive regular information on Acorn happenings and get access to public domain software available through the bulletin board. Wellington members will pay a higher subscription to fund the cost of meetings.

The following is the proposal from the Wellington Committee;

'A proposal for the functioning of the National User Group and for continuing communication with members.

The following points are taken as being of paramount importance:

1 Acorn New Zealand are selling more computers each year and there is a need to keep up regular support and communication with members outside the main centres.

2 A strong user group will be a positive force for communication with Acorn and can assist members with the purchase of items collectively.

3 The structure to achieve these ends exists now; it is time for more people to take an interest in promoting the advantages of the group and to help with leadership and getting the work done.

4 There is little to be gained by having separate Wellington and National groups; the willing workers are being divided instead of combined.

5 The proposals for continuing *Beeblet* are outlined below. There are some different approaches suggested, but the idea of *Beeblet* will continue, as a communication medium designed to keep members in touch with each other and with events in the Acorn world.

Given that there does not seem to be sufficient material to warrant the tremendous effort that the editor puts into the publication, the Wellington User Group proposes the following for 1992.

1 That *Beeblet* become a quarterly magazine for the year

2 That it be produced in three ways;

as an electronic magazine available on selected bulletin boards in various centres throughout the country

on disk for those who prefer it this way

a hard copy version for those who require it

Members would be able to choose the way they want to receive the magazine and there are already offers to make it a viable proposition from the Wellington Group point of view. A number of members of the Wellington User Group are prepared to try for at least a year to keep Beeblet and the National Group going.

Acorn have already been approached to become regular contributors to the magazine and it is hoped that they will be interested in providing copies of new programs for regular reviews.

Wellington think it should be possible to provide this service for a subscription of $15 for the 1992/93 year. All members will also get the monthly Wellington User Group Newsletter.

For your information the following nominations have been received for the incoming committee. This does not preclude changes or further nominations at the AGM.

President	Heather Wilkie
Secretary	Tony Wright (also Convenor)
Treasurer	Peter Browne (also Editor)
Committee	Julian Wright
	Philip Banks
	Friso Dijstelbergen
	Brian Mudge
	Jeff Hunt

BBC/ACORN COMPUTER USER GROUP NZ INC

STATEMENT OF INCOME AND EXPENDITURE

FOR YEAR ENDING 31 DECEMBER 1991

	$	$
INCOME	**1991**	1990
Subscriptions	**20**	200
Interest	**195**	437
Equipment Division	-	2
On behalf of LUG	-	20
Total Income	**215**	659
EXPENDITURE		
Printing	**1546**	814
Postage	**308**	371
Editor's Expenses	**450**	150
Administration	**157**	28
Depreciation	**100**	61
Auditor's Fee	**150**	100
Total Expenditure	**2731**	1524
Excess Expenditure over Income	**2516**	865

BALANCE SHEET AS AT 31 DECEMBER 1991

		$ 1991	$ 1990
	Accumulated Funds	**5279**	5421
	less Loss for Year	**2516**	865
	Subtotal	**2763**	4556
	add Prior Year adjustment		723
	Balance	**2763**	5279
	Represented by:		
	Bank of New Zealand	**640**	1035
	BNZ Finance	**2100**	4100
	Equipment	**64**	164
	1990 liability paid	**20**	-20
less	Unpresented Cheques	**- 61**	0
	TOTAL	**2763**	5279

EQUIPMENT SCHEDULE

	Book Value 1990	Depr'n	Book Value 1991
Paper Trimmer	80	40	40
2 Modems	44	22	22
Interword	20	19	1
Viewstore	20	19	1
Total	164	100	64

AUDITOR'S STATEMENT:

I have examined the financial records of the BBC/Acorn Computer User Group NZ Inc for the year ended 31 December 1991.

I have received all the information and explanations that I require.

According to those records, the Balance Sheet, above, and the attached Income and Expenditure sheet show a fair and true view of the financial operations of the Group for the year ended 31 December 1991.

Anne Squire
Hon Auditor

EDITORIAL REPORT

BEEBLET 1991/92

Below is a summary of the issues of *Beeblet* published since the 1991 AGM. Only two issues were published, in June 1991 and March 1992. About half of the 60 pages resulted from contributions. The Editor and material relating to the Group filled the rest.

It is mainly the lack of input to the magazine which has caused the committee to question the need for the Group.

Once again Auckland was conspicuous by the absence of any contributors. However activity north of the Bombay Hills was reported through regular newsletters from ABUG. The Wellington Group newsletters also provided information for local news.

Thanks again to Dr Fung, our local Wellington dealer for information on what is available locally and what it costs. Unfortunately we still don't seem to have a good link to Acorn NZ. Often information has been gleaned indirectly from other publications on things which may be of interest to members.

Thanks also to Don McDonald who took on the task of trying to drum up contributions. It's a pity that this didn't produce any new contributors.

Anyway, thank you to all the contributors listed below. Contributions have varied and there has been something for Model B, Master and Archimedes users.

Issues of Beeblet since March 1991

Volume 9, No 2	September 1991	36 pages
Volume 10, No 1	March 1992	24 pages

Authors		Issues
Llew Amon	Dunedin	9/2, 10/1
John Andrew	Wellington	9/2
Anne Squire	Edgecumbe	9/2
Tony Wright	Wellington	9/2
Don McDonald	Wellington	10/1

Colin Scarf
Editor, *Beeblet*

ACORN NEWS

A5000

Just after the last *Beehlet* was published, Acorn announced a new machine. The A5000 uses the ARM3 processor and the RISCOS 3 system. Acorn NZ took the opportunity to show the new machine during a visit by a UK trade delegation of Acorn software houses in October. Unfortunately their visit to Wellington coincided with a business trip out of town so I have not yet seen the machine. Initial orders in the UK mean that supplies are slow to arrive in New Zealand. Reports from Auckland suggest that some lucky locals have imported machines from the UK.

Despite the model number, the machine is not styled like the A3000. It is much more like an IBM machine with, reportedly, better styling than the A400 series. Two models have been announced. The full model has 2 MB of RAM, a 40 MB (IDE) hard drive and comes with an Acorn multiscan monitor. This version has been released and (what a coincidence!) the NZ price is $5,000 (incl GST). A "cut down" model with 1 MB of RAM, no hard disk and without a monitor will be released later. The NZ equivalent of the projected UK price is about $3200.

The A5000 does have limitations. It doesn't appear to have the memory expansion of the A540. However third party add-ons may make this possible. That limitation is reduced in some circumstances by the built-in software. This includes upgraded versions of !Edit, !Draw and !Paint in ROM. A font manager and a range of fonts is also in ROM. This makes it a more useful machine for desktop publishing as fonts take up quite a lot of space, particularly when working with a single floppy disk drive.

Another upgrade is to the floppy disk capacity. Up to 1.6 MB is now possible. It is also able to read and write to several PC disk formats and can format these disks. This means that you can transfer files from PC programs into RISCOS without needing additional software. The PC Emulator is still required to run DOS programs on the A5000 (At least I believe that is true - one report in a US computer magazine stated that the PC Emulator was supplied but the Acorn data sheet and UK reviews don't indicate this).

It is reported that RISCOS3 has 300 enhancements over RISCOS2. Significant improvements include multitasking of file operations and an increase in the number of such operations.

One consequence of the announcement was some significant price drops in the A400 range and the A540. This was necessary to reposition these machines relative to the A5000. The A410 machine has effectively been discontinued.

BBC/ACORN MAGAZINES

These are other sources of information for users of the Acorn range of machines.

Three monthly magazines, published in the UK, which are dedicated to the BBC and Acorn machines regularly appear on news agents shelves. These are;

BBC Acorn User

This magazine was known as *Acorn User* until the publishing company was bought by the BBC about 3 years ago. It covers the full range of BBC/Acorn machines. The current price is $8.65.

Micro User

This magazine also covers the full range of machines. Its current price is $10.35.

Archimedes World

Previously know as *A&B Computing*, this magazine now concentrates on the Archimedes range of machines. It now comes complete with a disk of software which is the reason for its higher price of $11.95.

Subscriptions to these magazines are generally dearer than the shop prices but you can generally expect to get your magazine about a month earlier. At greater cost, airmail subscriptions are available and the magazines arrive in New Zealand before the cover date. *BBC Acorn User* and *Micro User* have optional disks of software which are only available by subscription.

Beebug Ltd, which grew out of the original UK user group, now publishes two magazines. *Beebug* is celebrating 10 years of publication and continues to cover the BBC Model B and Master series of machines. *RISC User* is devoted to the Archimedes range. Each magazine appears 10 times a year. These are not sold in New Zealand *, so are generally only available on subscription. Subscribing to either magazine makes you a member of the "group" and entitles you to discounts on hardware and software marketed by Beebug Ltd. Subscription details are frequently advertised in the other magazines listed above.

(* Some local dealers may possibly import copies of these magazines.)

Norwich Computer Services (UK) publish a magazine called *Archive* for Archimedes users. This is also advertised in the other magazines.

Unlike *Beeblet*, these magazines are produced by professional staff. The major ones have been published since the Model B appeared. They generally have privileged access to new hardware and software so that informed reviews often appear at the time of product announcements.

HERITAGE - A Review of Sorts

by L. E. S. Amon, Dunedin.

One of the things for which I use my Master 128 is genealogy, the collection and organisation of information on my family history. This has been one of my activities since 1966, when a census of computers in New Zealand probably only reached low double figures, and anyone who predicted the present situation would have run the risk of being locked up for his own protection.

HERITAGE, a specialised database package for genealogists, was announced several years before it became a reality, and although I did not place my order (with cash) until the price was announced, a wait of two years followed before the package left the vapourware category. In the meantime the Model B gave way to the Master and the stock market crashed.

Finally the package arrived and at last I could start to play.

The disk catalogue told me I had version 1.9 but when I booted the disk the title only admitted to 1.8.

The manual was thorough enough in the tutorial section and above average in the reference section. But I did think it a little eccentric to have to read over a dozen pages before learning how to get started.

The package is a specialised database with linkages constrained by biological realities; every individual has exactly two parents - one male and one female. It can cope with individuals who marry up to nine times (the sample file was piece of the royal pedigree including Henry VIII) and have more than twenty children.

The basic unit is the individual, and a record is created for each one for whom information is entered.

Links are created between spouse's records and also between parents' and children's records. These links are two-way, and problems can arise if a link gets deleted in a single direction only; for some reason it has difficulty coping with the concept of an individual being the child of a childless parent! (This situation should not arise in normal operation, but it seems that you do not have to be very accident-prone to have it occur).

The strength of a package like this lies in the variety of ways in which it can present and reorganise the information which has been stored. Almost every format known to genealogists and within the constraints of computer printers is available in this package.

Combined with the sorting and searching capabilities of the package it is possible to make sense out of the most convoluted and widespread family relationships.

There is some bad news. The version supplied turned out to be an entomologist's delight. Support from the publisher turned out be non-existent; (no replies to a letter which enclosed a detailed account of half a dozen bugs, a patch to improve an inelegant feature, a registration form and three disks of illustrations).

Why bother? After all, although this was the first serious genealogical package for the BEEB, there have been several subsequently, and their level of support could hardly fail to be better. The good news follows.

The concept was too good to be let fail through inability of the distributor to give support. The package as described was said to be better than PAF, one of the standard packages for this application on IBM-compatibles.

A user group formed and enthusiastically began to hunt down and exterminate bugs. Their 2.0 release got a lot of them and tidied up a few ragged ends. Then they tracked down the copyright owner and got his permission to distribute to new users.

Things are now looking up, and a 2.1 release has arrived.

Overall, I should not rush out to buy a BEEB in order to get access to this package, but having the hardware already, this package does the job quite nicely.

With the proviso that the prices are only from memory, HERITAGE is now available from the Heritage User Group (HUG), c/o W.B. Woollen, "Greensward", Townsend, Harwell, Didcot, Oxon OX11 0DX, U.K. at a cost of 10 pounds.

The annual membership subscription for HUG costs 1 pound at present.

WELLINGTON DEALER SALE

The poor economic climate is evident in the Wellington computer scene. Several computer shops have closed recently.

Dr Fung has recently reduced the opening hours of his Acorn shop (to 1.30 - 5.30pm, Monday to Friday) and he intends to further reduce the hours. He will remain at the present address (see list in last *Beeblet*) until the lease expires at the end of this year. Dr Fung then plans to continue in business but clients will need to make arrangements by telephone.

The scaling down of his retail activities will begin in March with a sale of computer hardware and software and shop furniture. You may be able to twist his arm for a good deal on some of the demonstration machines.

ANOTHER PRIME NUMBER DIAGRAM

by L. E. S. Amon, Dunedin.

When I wrote the article on Ulam's prime number diagram for the last issue of *Beeblet*, I carefully avoided the suggestion that there was any logical extension of the idea, or that I was working on one. I was therefore surprised when Don McDonald sent me a copy of a letter he had written on the subject, and disconcerted to find that he was thinking along the same lines as I was. So here, a little earlier than I had intended, are my thoughts on extending the idea.

The first step was to avoid the 90 degree changes in plotting at the diagonals, without destroying the structure of the diagram. After a little playing around I came up with the following arrangement:

```
16  ..
  15  ..
9  14  ..
  8  13  ..
4  7  12  19
  3  6  11  18
1  2  5  10  17
```

Horizontally and vertically, odd and even numbers alternate, and lines parallel to the bottom left to top right diagonal alternate between all odd and all even. The lefthand column has all the perfect squares, none of which are prime, and all numbers of form n^2-m^2, where n-m>0, lie in vertical columns m^2 units from the lefthand side.

In the course of deriving a formula that would calculate the number represented by a point on the screen, I realised that the results of plugging in negative values of x & y were also meaningful. As the line y=-x formed an axis of bilateral symmetry, it seemed logical to turn the entire system an eighth of a turn counterclockwise, to make that axis of symmetry horizontal. This also had the beneficial side effect of simplifying my formula.

The diagram now looked like this:

```
  .. .. .. .. 19 18 17
16 15 14 13 12 11 10
    9  8  7  6  5
       4  3  2
          1
```

and with the extensions (in all directions), like this:

```
   .. .. .. .. 19 18 17.16 15 14 13 12 11 10 9
17.16 15 14 13 12 11 10. 9 8 7 6 5 4 3 2 1
11 10. 9 8 7 6 5. 4 3 2 1
7 6 5. 4 3 2. 1
5 4 3 2. 1.
5 4 3 2 1
7 6 5 4 3 2 1
11 10 9 8 7 6 5 4 3 2 1
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
   .. .. .. .. 19 18 17 16 15 14 13 12 11 10 9
```

The single dots mark the boundary of the main diagram, which is plotted with double intensity by the program that follows. At the Offset? prompt, enter the coordinates of lower left corner of the screen, imagining the screen to be a window on a region of the diagram. -128,0 or -128,-128 are suitable first values.

```
 10 REM TRULAM - An alternative Prime Number Diagram
 11 REM
 12 REM Copyright (C) L.E.S. Amon 1991
 15 REM
 20 REM 17.16 15 14 13 12 11 10. 9 8 7 6 5 4 3 2 1
 21 REM 11 10. 9 8 7 6 5. 4 3 2 1
 22 REM 7 6 5. 4 3 2. 1
 23 REM 5 4 3 2. 1.
 24 REM 5 4 3 2 1
 25 REM 7 6 5 4 3 2 1
 26 REM 11 10 9 8 7 6 5 4 3 2 1
 27 REM 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 28 REM
 30 DIM P%(310),M%(8)
 40 MODE 128 : REM This clears the screen! MODE 0 on Model B
 50 VDU 24,0;0;1023;1023; : REM Graphics area
 70 VDU 28,64,31,79,0,14 : REM Text area with VDU14 set
 80 PROCINIT : REM Initialise variables
 90 PROCPRIME : REM Calculate & store all primes <= 2053
100 PROCLABEL
120 FOR J%=0 TO 255 : REM Bottom to top
130 L%=(J% + JJ%) * (J% + JJ% + 1)
140 FOR I%=255 TO 0 STEP -1 : REM Right to left
150 M%=1 - I% - II% ^+ L%
160 IF M%<1 THEN 400 : REM Avoid testing -ve numbers
190 PROCTEST
200 IF P%<1 THEN 400 : REM Avoid plotting blank space
280 PLOT 69,X%*I%,Y%*J%
290 IF M%>(J%+JJ%+1)^2 OR M%<(J%+JJ%)^2+1 THEN 400
300 PLOT 69,X%*I%+2,Y%*J% : REM Intensify principle part
```

```
400 NEXT
410 NEXT
499 STOP
500 DEF PROCLABEL
540 PRINT TAB(0,2);B$;
550 PRINT TAB(0,29);"TrUlam"
580 PRINT TAB(0,31);"Offset=";II%;",";JJ%;
590 PRINT TAB(0,4);B$
599 ENDPROC
600 DEF PROCTEST
601 REM Test if M% prime
610 P%=1 : REM Assume prime until proven otherwise
620 IF M%<4 AND M%>0 THEN 690
630 MM%=M% MOD 6
640 IF MM%<>1 AND MM%<>5 THEN P%=0 : GOTO 699 : ELSE SQM%=SQR(M%)
650 FOR KK%=1 TO K%
660 IF M% MOD P%(KK%)=0 THEN P%=0 : KK%=K% : GOTO 680
670 IF P%(KK%)>SQM% THEN KK%=K% : REM K% is number of primes <= 2041
680 NEXT
690 IF P%=1 THEN PRINT TAB(0,1);B$;TAB(0,1);M%
699 ENDPROC
700 DEF PROCPRIME : REM Identify primes <= 2053
720 M%(1)=-13 : M%(2)=-11 : M%(3)=-7 : M%(4)=-1 : M%(5)=1 : M%(6)=7 : M%(7)=11 :
M%(8)=13
730 P%(0)=1 : P%(1)=2 : P%(2)=3 : P%(3)=5 : P%(4)=7 : P%(5)=11 : P%(6)=13
740 N%=2041
750 JMAX%=6 : REM Index of max stored prime
760 FOR I%=30 TO N% STEP 30
770 SQIL%=SQR(I%+13)
780 FOR L%=1 TO 8
790 FOR J%=2 TO JMAX%
800 IF(I%+M%(L%)) MOD P%(J%) = 0 THEN J%=JMAX% : GOTO 830 : REM Composite
810 IF P%(J%)>SQIL% THEN JMAX% = JMAX%+1 : P%(JMAX%)=I%+M%(L%) : J%=JMAX% :
REM Another prime stored
820 PRINT TAB(0,0);I%+M%(L%);
830 NEXT : NEXT : NEXT
899 ENDPROC
1000 DEF PROCINIT
1010 X%=4 : Y%=4 : REM Pixel increments
1020 M%=1: K%=309 : REM M%=Natural number, K%=Prime count
1030 P%=1 : REM PLOT parameter; 1=mark, 0=no mark
1040 B$="                    "
1060 PRINT TAB(0,4);:INPUT "Offset",II%,JJ%
1070 II%=4*INT((II%+3)/4) : JJ%=4*INT((JJ%+3)/4)
1099 ENDPROC
```

The diagram has the ordered chaotic appearance of Ulam's original diagram, but when we look for the reason, it turns out that the answer is again in the negative; the pattern lies in the white space. Again this can be seen by running a modified version that plots multiples of a seed number. This can be done by loading a saved copy of the program and typing in the following modifications:

```
 10 REM TRULAMEXP1 - An Alternative Prime Number Diagram     Explanation
 90 PROCSEED
190 PROCTEST1
550 PRINT TAB(0,29);"TrUlamExp1"
560 PRINT TAB(0,30);"Seed=";Q%
900 DEF PROCTEST1
910 IF M% MOD Q% = 0 THEN P% = 1 ELSE P% = 0
920 ENDPROC
1100 DEF PROCSEED
1110 INPUT "Seed",Q%
1140 ENDPROC
1200 DEF PROCTEST2
1210 REM X^2 - X + W%
1220 O% = M% - W%
1230 ::IF O% < 0 THEN P% = 0 : GOTO 1299
1240 O% = INT(SQR(O%))
1250 IF O%*(O%+1)+W% = M% THEN P%=1 ELSE P%=0
1299 ENDPROC
1300 DEF PROCTEST3
1310 REM X^2 - W%
1320 O% = M% - W%
1330 IF O% < 0 THEN P% = 0 : GOTO 1399
1340 O% = INT(SQR(O%))
1350 IF O%*O%+W% = M% THEN P%=1 ELSE P%=0
1399 ENDPROC
```

The pattern of primes is the negative of all the patterns plotted by the modified program, (excluding the first point plotted in the case of primes), just as in the case of the original Ulam diagram.

Returning to the new diagram, the patterns that the eye detects most readily are straight lines, all of which represent quadratic formulae. Some of these are particularly "rich" producers of prime numbers, like the formula:

n^2 - n + 41

which produces 40 prime numbers before producing its first composite number (naturally) at n=41. These first 40 numbers are:

41 43 47 53 61 71 83 97 113 131 151
173 197 223 251 281 313 347 383 421 461 503
547 593 641 691 743 797 853 911 971 1033 1097
1163 1231 1301 1373 1447 1523 1601 ....

After that, composite numbers turn up more frequently as (-n +41) becomes negative. Whenever this term becomes a perfect square the whole expression becomes composite.

Other factorisations begin to appear at irregular intervals. Because each integer is represented once per line on the extended diagram, the same sequence of numbers can be represented by lines of different slopes. In particular the rather prominent lines of slopes +/-0.5 represent the same sequences as the vertical lines they intersect at the horizontal (y=0) axis.

Less eyecatching are the features aligned with slopes of +/-1, partly because the dominant features are the dark lines of numbers of the form, n^2 - m^2. These always factorise into (n+m)(n-m), which is never prime if (n-m) > 1.

Loading a copy of TRULAMEXP1 and typing in the following modifications will allow you to single out an individual family of points obeying the n^2 - n + m formula. The modified program will accept a value for m as the reply to the Origin? prompt.

```
  10 REM TRULAMEXP2 - An Alternative Prime Number Diagram     Explanation
  90 PROCPRIME : REM Calculate & store all primes <= 253
 190 PROCTEST
 550 PRINT TAB(0,29);"TrUlamExp2"
 560 PRINT TAB(0,30);"Origin=";W%
 610 PROCTEST2
 620 IF P% = 0 THEN 699
 700 DEF PROCPRIME : REM Identify primes <= 253
 740 N%=253
1050 PRINT TAB(0,2);:INPUT "Origin",W%
1055 W%=2*INT((W%-1)/2)+1
```

The following modification to TRULAMEXP2 plots points for a given m using the n^2 - m^2 formula. Note that line 1055 has to be deleted to make TRULAMEXP3.

```
  10 REM TRULAMEXP3 - An Alternative Prime Number Diagram     Explanation
 550 PRINT TAB(0,29);"TrUlamExp3"
 610 PROCTEST3
1055
```

In both programs altering line 190, to PROCTEST2 in the case of TRULAMEXP2 or PROCTEST3 in the case of TRULAMEXP3, allows us to plot all numbers, both prime and composite, in a given family.

A final word about running times and speed. The first program generates and stores all primes up to the square root of the integer limit of BBC BASIC *. This is unnecessarily time-wasting if the outer regions of the diagram are not going to be explored. Adjust the value of N% at line 740 to the square root of the maximum prime that you wish to test. If you have more efficient algorithms for generating and testing primes, substitute them for PROCPRIME and PROCTEST. And finally, there is much scope for speeding up TRULAMEXP 3 & 4, by not considering testing the large areas of the screen which are predictably blank.

REFERENCES

L.E.S. Amon, *Beeblet*, September 1991.

A.K. Dewdney, Computer Recreations, Scientific American,

July 1988, pp.90-93. Brief follow-up in December 1988.

D.S. McDonald, *Beeblet*, March 1992.

EDITOR'S NOTES

Don McDonald sent Llew a copy of an article which he submitted to *Beeblet* and the NZ Mathematics Magazine. This is reproduced on the following pages.

* Llew advised me recently of an error of fact in his article. Unfortunately time constraints have prevented me from working out how best to alter the incorrect statement so I simply reproduce Llew's comment.

"In my second article on prime number diagrams, I stated that primes up to 2048 would suffice to test primes up to the integer limit of BBC BASIC. This is, of course, a foul libel and it requires primes up to SQR(2^31-1) = 46340.952 to test integers up to 2^31-1 = 2147483647."

Good to see Acorn NZ keeping up their profile by sponsoring a competition in the Dominion Infotech supplement on 25 February. But what were those GOSUB's doing in the program listing?!

ULAM PRIME NUMBER GRID, FLATTENED

an extension of L.E.S. Amon's article (September 1991) including simpler BASIC2 program and plot.

by Don S McDonald

The natural numbers (counting integers), 1,2, ..., are written in a spiral grid, spider web pattern (after Stanislaw M Ulam's mathematics conference doodle), beginning with 1, (the centre), 2, and proceeding- unfolding anticlockwise (indefinitely) :

5 4 3
6 1 2
7 8 9 10.

Such of these numbers as are prime (have no positive integer factors other than 1 and the number itself), are circled or highlighted.

Then the primes appear to fall more often than random on certain diagonal lines of the diagram. This much has been covered by Llew Amon's September 1991 article in *Beeblet*, or his references to *Scientific American*.

Amon gives a program in BASIC, which purports to plot the prime points up to 256 squared, equals 65,536. The timing information was indefinite - "some time."

Prime numbers are discussed in connection with illustrations of the Ulam diagram in two 1988 mathematics books, (Hoffman, 1988, and Peterson, 1988.)

I suggest a change which may be introduced to the diagram. It is to divide the diagram into two right-angle, icoseles triangles, by the downward-sloping diagonal. This would produce a lower (left) triangle, and upper (right) triangle.

Further, squash or flatten these triangles by expanding the right-angle to 180 degrees, in each case. If "L" represents two sides of a square from the lower triangle, it is flattened out, or stretched (projected), to "_" (underscore). Successive square outlines yield "." (period), "-" (hyphen), and "_" (underscore). The flattened squares stack, up-and-down, as the rows of two triangles: - . _ (or, sideways i.:l), profile X, lengthening sides as distance increases from apex. (Spider web.)

These changes possibly make for an easier, shorter, and faster program, which nevertheless plots Ulam type lines where primes are relatively common.

The new program has less than a half the number of lines of the earlier program in Beeblet.

The line(s), 3-1-7, which previously were diagonal, now appear vertically :

```
        16 15 14 13p 12 11p 10
                4 3p 2p
                       1
             5p 6 7p 8 9
     17p 18 19p 20 21 22 23p 24 25 .
```

The triangular pattern is enhanced if alternate columns (multiples of 2) are deleted. (Since all even numbers except number 2 are composite, naturally they do not appear in Ulam diagrams.)

My new program, "NEULAM", displays prime number points up to 88 squared, equals 7744; either the upper triangle or lower triangle, depending as the inputted value of starting row, (2 to 88) is even or odd, respectively. The calculation time is less than 50 seconds.

The resulting plots are shown in figures 1 and 2. The annotation TEST, refers to the starting putative prime for the row that begins at LEFT and ends at ROW number (column down), (n.b. Row squared.)

You may be able to spot empty lines in the plot corresponding to the factorisation:

R^2 - x^2 = (R-x)(R+x), composite.

The program listing of "NEULAM" follows. "P%" is a (4-byte) integer variable for putative prime number. R%, S%, F%, refer to square Root (equals maximum factor), Square, and Factor, respectively. "VDU 5" (or 4), are visual display unit commands to print at the graphics (or text) cursor. I hope you can guess at the meanings of other commands if they are not obvious.

Further experimentation. What happens if figures 1 and 2 are interleaved or superposed? Can this be achieved by a minimum alteration to the program?

Research topic. A famous Conjecture can be put as follows. "Every row of the (McDonald-Ulam) grid is non-empty."

No-one has been able to prove whether there is "always at least 1 prime between any perfect square, (starting at 2-squared, equals 4), and its succeeding square, (3-squared, etc.)"

The 'Prime Number Theorem' implies that the n-th prime number is expected at approximately, n.log n. Therefore, the difference between the n-th and (n+1)-th prime numbers is expected to be about log n. The difference will be more or less than (log n). This is the horizontal space between successive dots on the grid.

What is the commonest difference between successive prime numbers? The prime numbers are: 2,3,5,7,11,13,17,19,23,29,31, ...

The differences are: 1,2,2,4 , 2, 4, 2, 4, 6, 2 ... .

Is 2, 4, 6, or some other number, the commonest difference 'in the limit.'?

References.

L E S Amon, Prime numbers and the Ulam Diagram, *Beeblet*, vol 9 no 2, September 1991

A K Dewdney, Computer Recreations, Scientific American, July 1988: 90-93.

ditto, short comment, December 1988.

Paul Hoffman, "Archimedes' Revenge, the Joys and Perils of Mathematics", W W Norton, 1988, Penguin 1988.

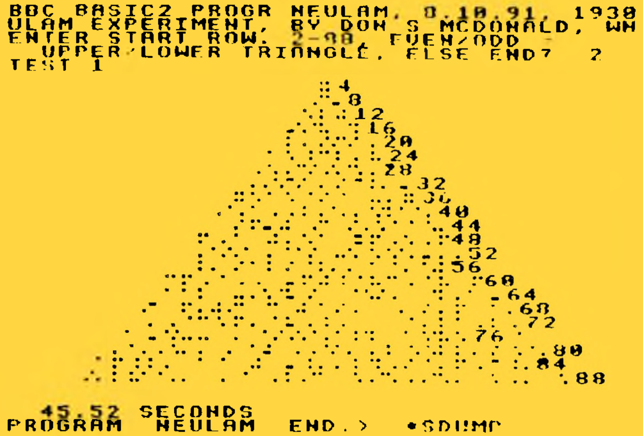
Ivars Peterson, "The Mathematical Tourist: snapshots of modern mathematics", W H Freeman, N.Y., 1988.

David A Thomas, "Math projects for Young Scientists", Franklin Watts, 1988.

Don S McDonald, Evening Post/ Dominion (Wellington), 9.11.91. Wanted to Sell "A Lotto Combination ... (maths results.)"

```
REM *IWORD. NEWLAMB, 8.10.91, 1745
RENumber. >LISTO7 >LIST
  10 MODE4: PRINT"BBC BASIC2 PROGR NEULAM, 8.10.91, 1930"
  20 PRINT"ULAM EXPERIMENT, BY DON S MCDONALD, WN": REM F 63, 5 HUTCHISON
RD, WELLINGTON 2, N.Z. (04) 3-896-820
  30 REM "REF  BBC/ACORN COMPUTER USER GROUP NZ NEWSLTR 'BEEBLET', SEPT
91, ARTICLE LLEW AMON"
  40 INPUT"ENTER START ROW, 2-88, EVEN/ODD =""  UPPER/LOWER TRIANGLE, ELSE
END";R%
  50 NOW=TIME : REM CENTISEC CLOCK
  60 IF R%<2 OR R%>88 THEN GOTO 200
  70 P%=2*(((R%-1)^2) DIV 2)+1 :PRINT"TEST ";P%
  80 VDU5 : REM CURSOR
  90 FOR R% = R% TO 88 STEP2
 100   S%=R%^2 :R2%= 2*R%
 110   REM P-RIME, R-OOT, S-QUARE, F-ACTOR
 120   FOR P% = P% TO S% STEP2
 130     FOR F% = 3 TO R% STEP2
 140       IF P%MODF% THEN NEXTF%
 150     IF F%>R% THEN PROCPRIME:ELSE F%=S%: NEXT F%
 160   NEXT P%
 170 IF R%MOD4 <2 THEN PRINT;R%
 180 P%=P%+R2%
 190 NEXT R%
 200 VDU4 : PRINT TAB(2,29);.01*(TIME-NOW)" SECONDS" '"PROGRAM  NEULAM
END.";:END : REM CURSOR
```

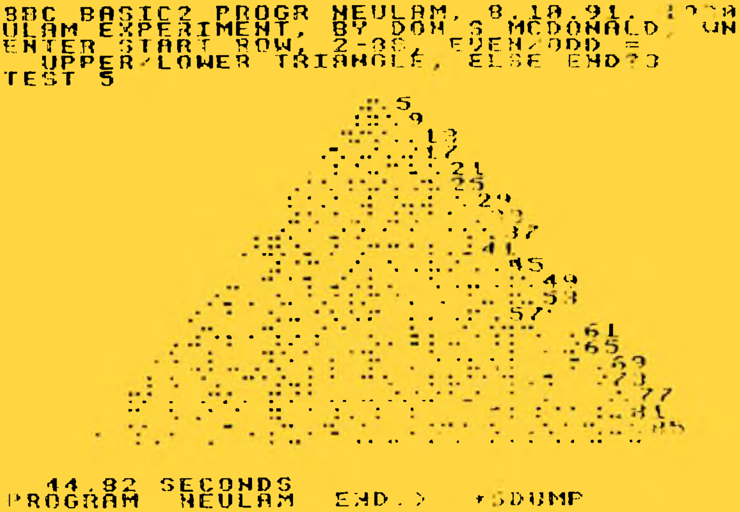
```
210 :
220 DEFPROCPRIME
230 REM  PRINT;P%" ";:ENDPROC
240 D% = P% +R% -S%
250 MOVE 600+5.5*D%,880-8*R%:PRINT;".";
260 ENDPROC
```



```
BBC BASIC2 PROGR NEULAM, 8.10.91, 1938
ULAM EXPERIMENT, BY DON S MCDONALD, WH
ENTER START ROW, 2-98, EVEN/ODD =
   UPPER/LOWER TRIANGLE, ELSE END?   2
TEST 1
```

```
  45.52 SECONDS
PROGRAM  NEULAM  END.>  *SDUMP
```

Figure 1



```
BBC BASIC2 PROGR NEULAM, 8.10.91, 1938
ULAM EXPERIMENT, BY DON S MCDONALD, WN
ENTER START ROW, 2-98, EVEN/ODD =
   UPPER/LOWER TRIANGLE, ELSE END?3
TEST 5
```

```
  44.82 SECONDS
PROGRAM  NEULAM  END.>  *SDUMP
```

Figure 2

USER GROUP MEETINGS or LOCAL CONTACTS

AUCKLAND:	2nd and 3rd Wednesday of each month at Social Club, Auckland Hospital, Grafton Road at 7.30pm. Contact Tony Krzyzewski (Pres), phone 267 6786.
North Shore:	last Wednesday of the month, 7.30pm, Salvation Army Hall, Glenfield Road, Glenfield. Contact: Chris, phone 419 0543 (wk).
CHRISTCHURCH:	fortnightly workshops, Monday 6.30pm at Hagley High School. phone Michael 358 2267.
HAWKES BAY:	2nd Sunday 2.30pm, Taradale Primary School. Contact Ron: 844 4970, John: 844 5729 (librarian), Major: 844 7729, Mitch: 878 5395.
INVERCARGILL:	Southland Education Centre, 70 Doon St. Contact Bob Evans, 217 3050 or Lyndon McEntee 208 7365.
NELSON:	Contact: Mike Rose 548 6367, or Richard 544 8489.
PALMERSTON NORTH:	Phone Brian Knowles 357 9319.
TAUPO:	meetings irregular. Contact: David 378 4215 (h), 378 5214 (wk), Lou 378 9309.
TAURANGA:	Contact: Chris and Jane 65 076.
TOKOROA:	1st Friday of month, 7.30pm, Tokoroa High School. Contacts: Don Fraser, 886 8813 or Graeme Robertson, 886 5346, Tokoroa.
WAIKATO:	first Monday of the month, 7.30pm, Royal NZ Foundation for the Blind, 51 Grey St., Hamilton. Contact: Lawrie 849 6434, Neil 827 3305.
WELLINGTON:	Third Wednesday of the month, 7.30pm, Epuni Community Centre, cnr Oxford Tce & Mitchell St, Lower Hutt. Workshops: first Wednesday of month, St Bernard's School, 40 Taft St, Brooklyn. For other details: ph. Peter 567 3486 or Tony 563 8301.
OTHER CENTRES:	let us know and we will publish details here.

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